

Paint by Numbers (Nonogram)

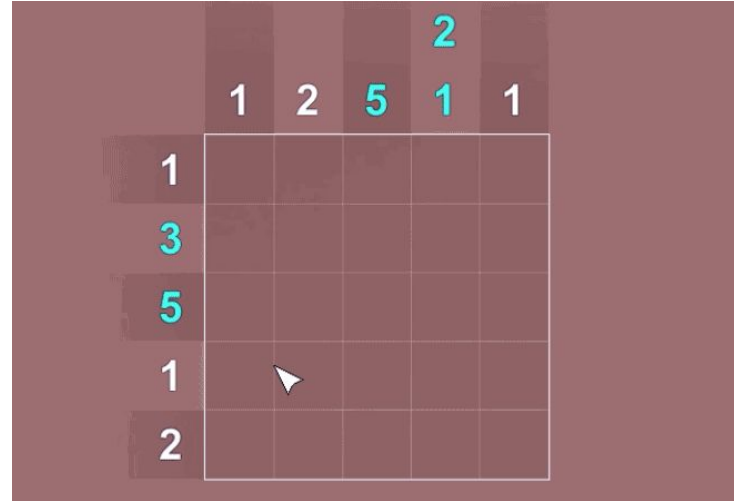
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CS 142

What is a nonogram?

Nonogram

- other names: **Hanjie**, **Paint by Numbers**, **Picross**, **Griddlers**, **Pic-a-Pix**
- an encrypted image is revealed by coloring blocks/cells of a grid based on the numbers hinted at the sides.

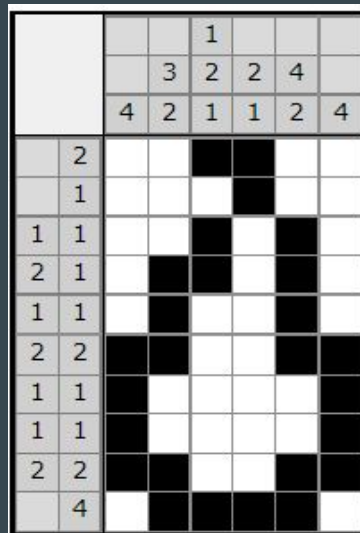


Source: <https://www.alphabetagamer.com/pictopix-beta-demo/>

Nonogram

- **Hint numbers** → number of boxes that needs to be colored
- **Order** of the numbers indicate the order of the groups of colored blocks
- **B&W**: Must have at least **one space** in between sets
- **Colored**: same as B&W; sometimes no spaces for adjacent different colors

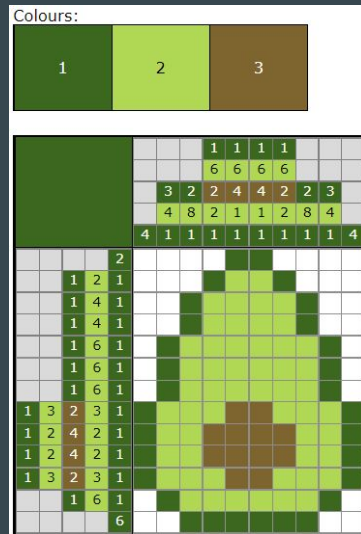
B&W



Source:

<https://www.nonograms.org/nonograms/i/50550>

COLORLED



Source:

<https://www.nonograms.org/nonograms2/i/50864>

**Why is a nonogram an
NP-complete problem?**

Nonogram as an NP-complete problem

- Each nonogram displays a unique encrypted image.
- There is no “good” solution for all nonogram puzzles.

	1	1
1		-
1	-	

	1	1
1	-	
1		-

Source:

<https://medium.com/smith-hcv/solving-hard-instances-of-nonograms-35c68e4a26df>

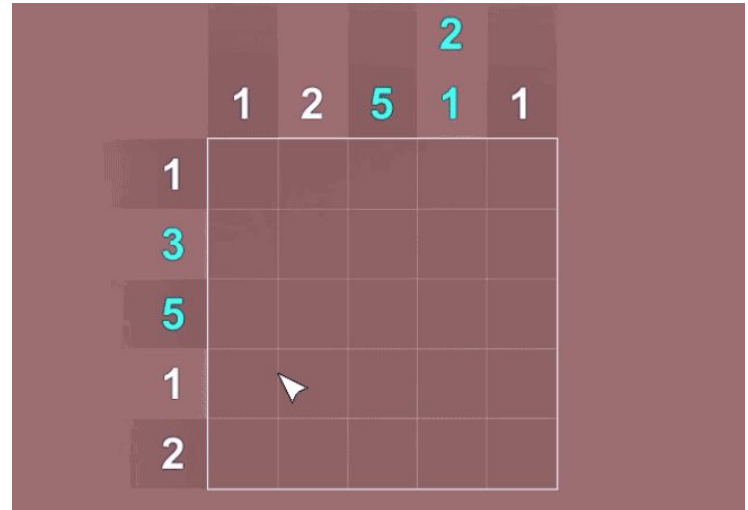
How to solve?

Possible Solutions

- Depth-First Search
(backtracking)
 - Visualization:
<https://lihautan.com/solving-nonogram-with-code/7bfbcf67e3276087.gif>

Possible Solutions

- Priority Queue & Breadth-First Search (contradiction)



Source: <https://www.alphabetagamer.com/pictopix-beta-demo/>

Let's try solving one!

References

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